REPÚBLICA PORTUGUESA
AGRICULTURA E PESCAS

dgav
Direção Geral de Alimentação e Veterinária

HubRAM

UM PROJETO DE INVESTIGAÇÃO E INOVAÇÃO

Webinar: **Transformar Sistemas Agroalimentares para reduzir a RAM: da Teoria à Prática**

27-11-2025, 14:30

Orador Convidado: Jorge Pinto Ferreira (FAO)

Moderação: **Andrea Cara d'Anjo (DGAV), Manuela Guerra (DGAV/ESHTE)**

hubram

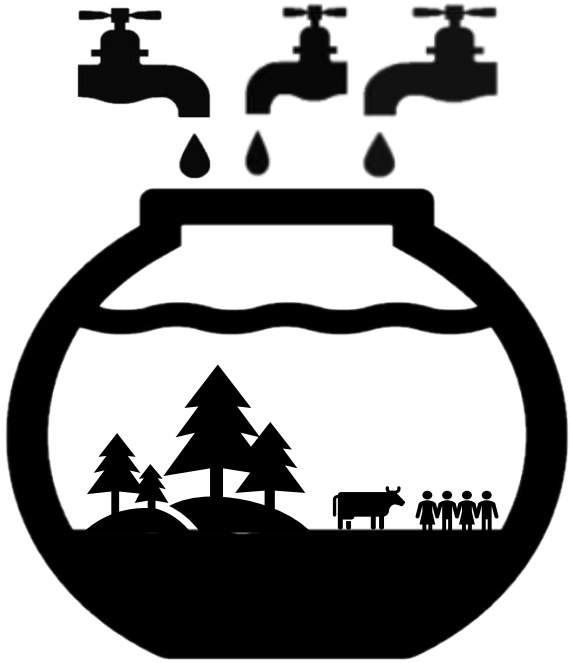
Investimento RE-C05-i03
Agenda de investigação e inovação para a sustentabilidade da agricultura, alimentação e agroindústria

PRR Plano de Recuperação e Resiliência

REPÚBLICA PORTUGUESA

Financiado pela União Europeia NextGenerationEU

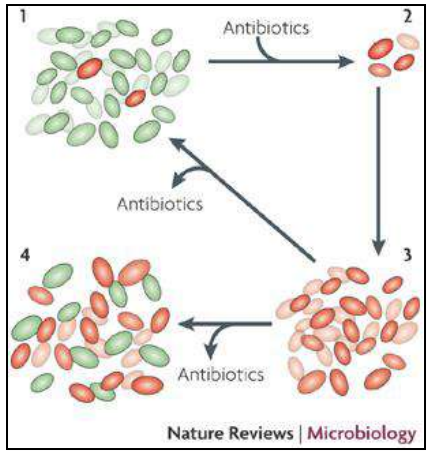
AMR /AMU – ONE HEALTH



Two different worlds?

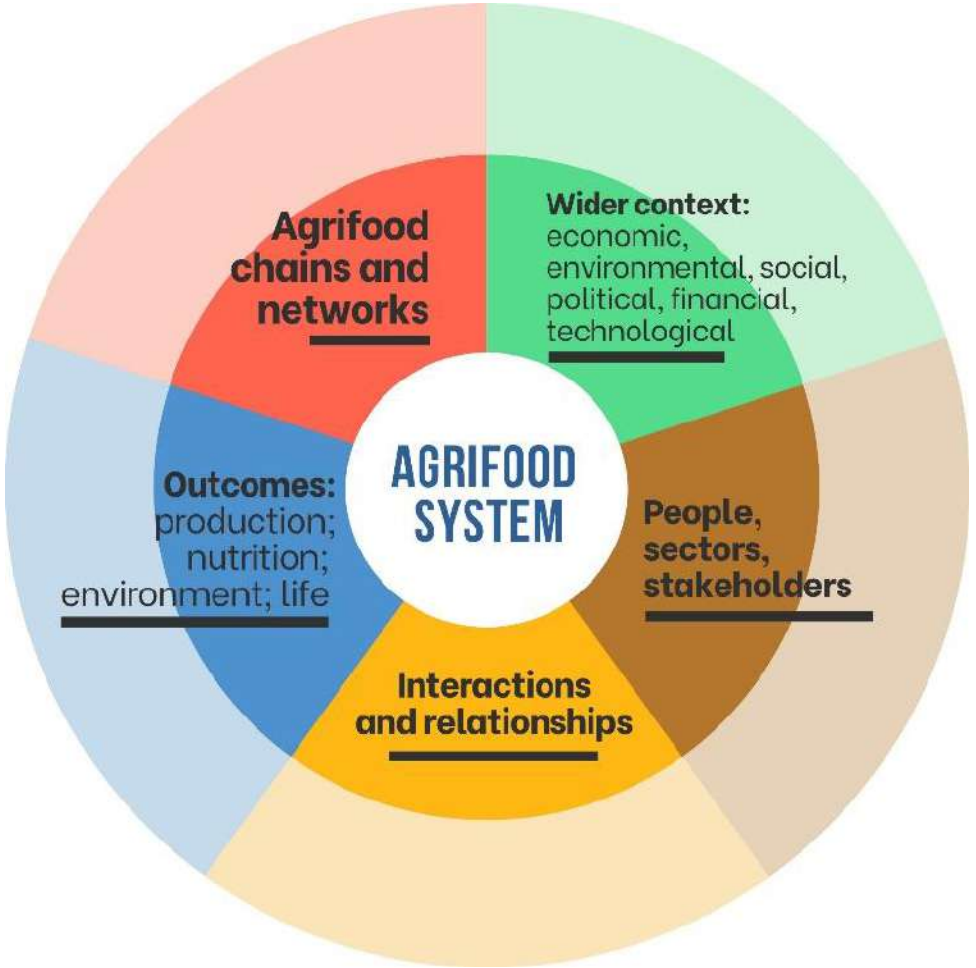
FOOD

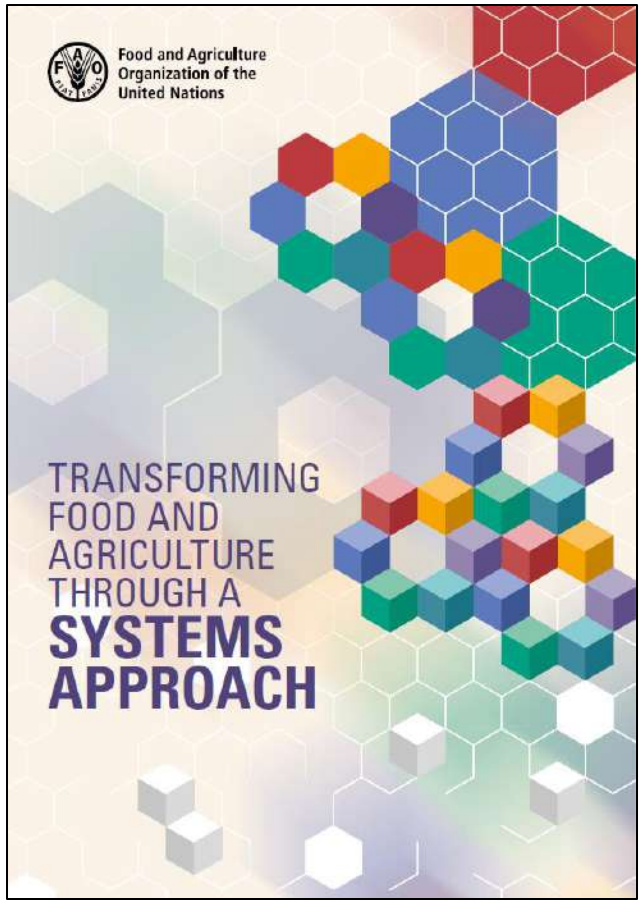
AMR

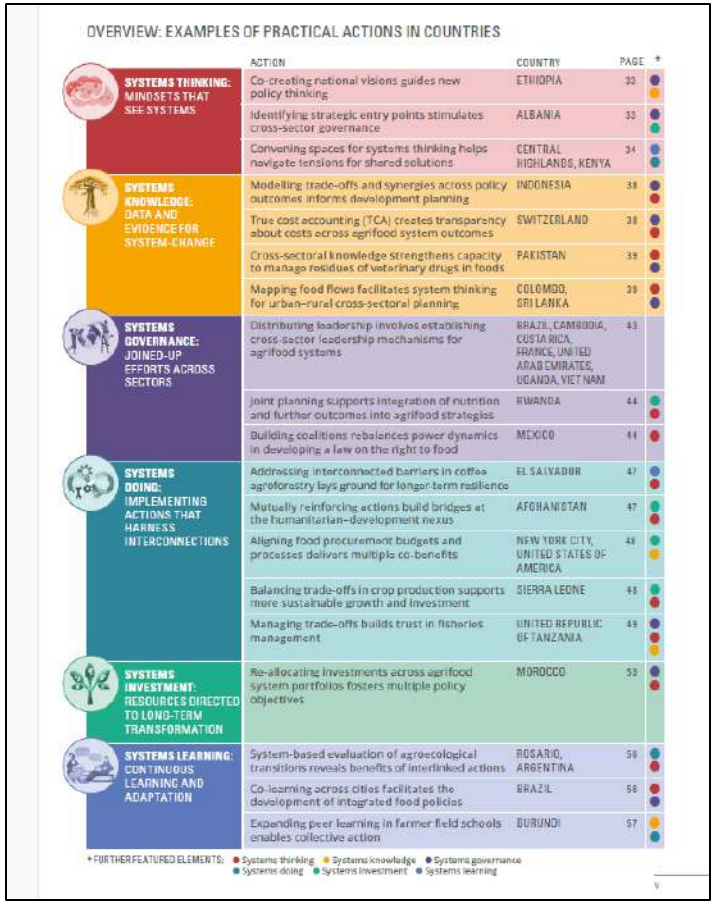


If it is not safe, it is not food. And people do get foodborne AMR infections.

Agrifood Systems & Food Safety *… are deeply interconnected …*







OVERVIEW: EXAMPLES OF PRACTICAL ACTIONS IN COUNTRIES

	ACTION	COUNTRY	PAGE	+
SYSTEMS THINKING: MINDSETS THAT SEE SYSTEMS	Co-creating national visions guides new policy thinking	ETHIOPIA	33	
	Identifying strategic entry points stimulates cross-sector governance	ALBANIA	33	
	Convening spaces for systems thinking helps navigate tensions for shared solutions	CENTRAL HIGHLANDS, KENYA	34	
SYSTEMS KNOWLEDGE: DATA AND EVIDENCE FOR SYSTEM-CHANGE	Modelling trade-offs and synergies across policy outcomes informs development planning	INDONESIA	38	
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	Cross-sectoral knowledge strengthens capacity to manage residues of veterinary drugs in foods	PAKISTAN	39	
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SYSTEMS GOVERNANCE: JOINED-UP EFFORTS ACROSS SECTORS	Distributing leadership involves establishing cross-sector leadership mechanisms for agrifood systems	BRAZIL, CAMBODIA, COSTA RICA, FRANCE, UNITED ARAB EMIRATES, UGANDA, VIET NAM	43	
	Joint planning supports integration of nutrition and further outcomes into agrifood strategies	RWANDA	44	
	Building coalitions rebalances power dynamics in developing a law on the right to food	MEXICO	44	
SYSTEMS DOING: IMPLEMENTING ACTIONS THAT HARNESS INTERCONNECTIONS	Addressing interconnected barriers in coffee agroforestry lays ground for longer-term resilience	EL SALVADOR	47	
	Mutually reinforcing actions build bridges at the humanitarian–development nexus	AFGHANISTAN	47	
	Aligning food procurement budgets and processes delivers multiple co-benefits	NEW YORK CITY, UNITED STATES OF AMERICA	48	
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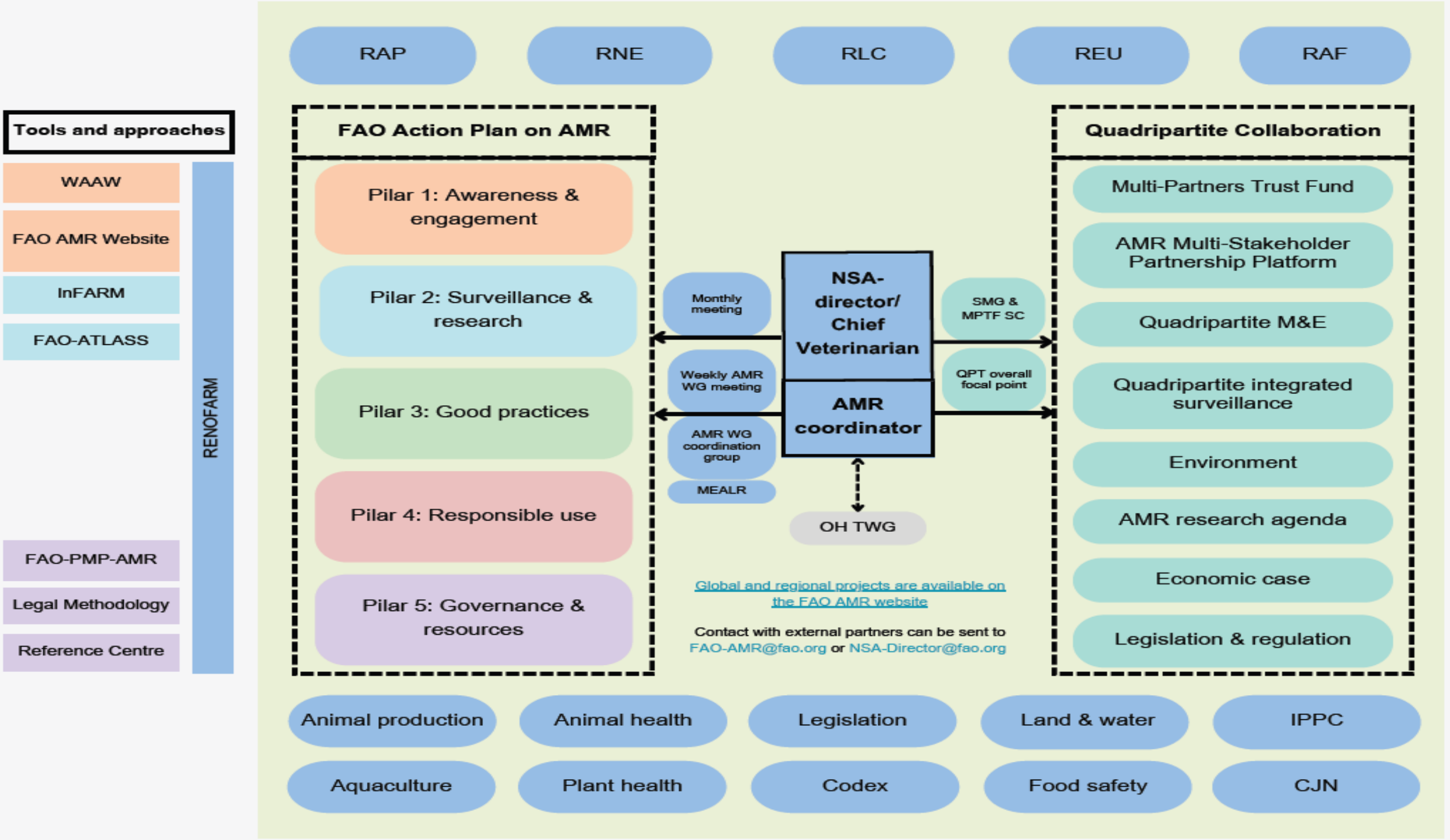
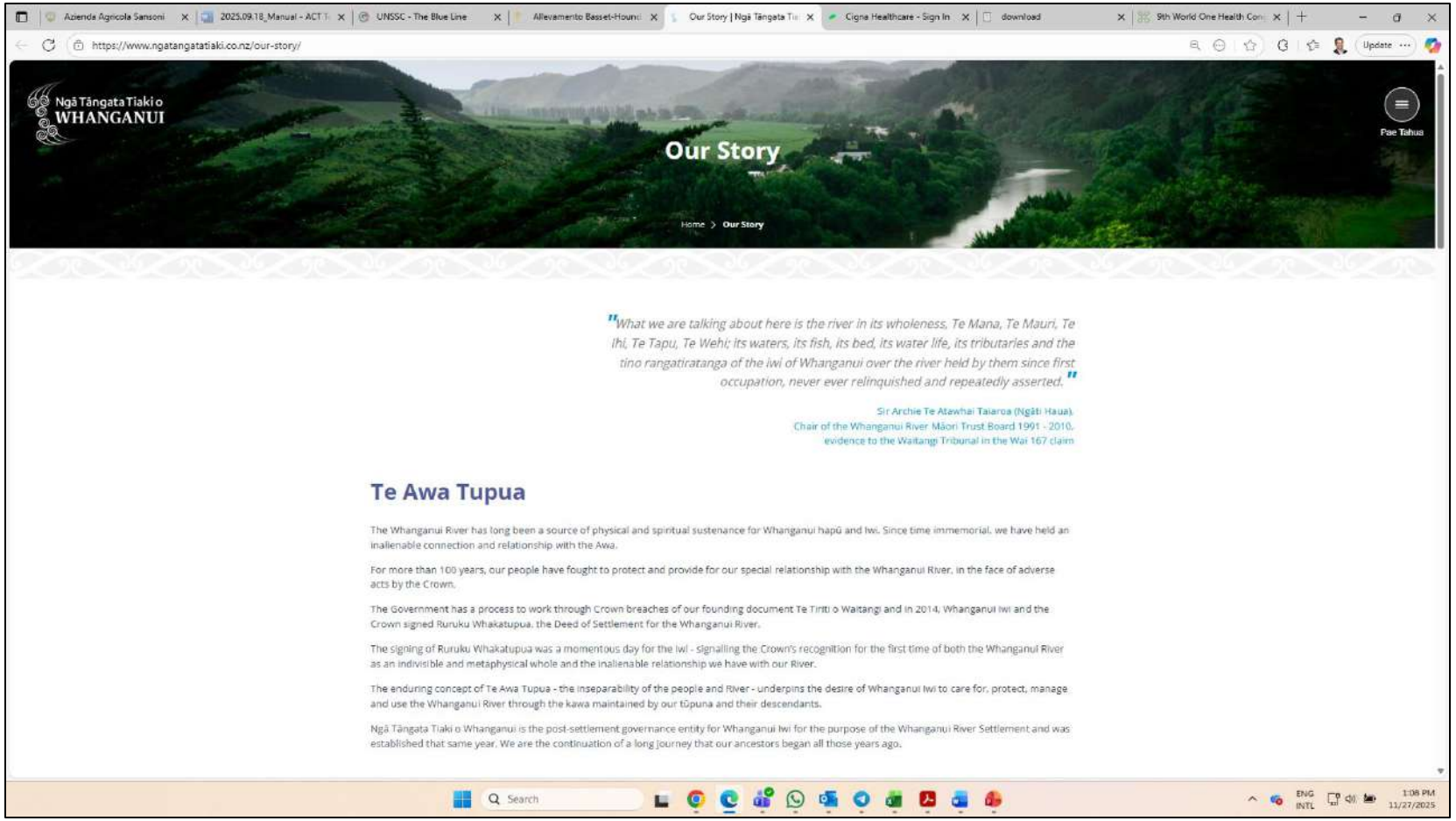
	Co-learning across cities facilitates the development of integrated food policies	BRAZIL	56	
	Expanding peer learning in farmer field schools enables collective action	BURUNDI	57	

+ FURTHER FEATURED ELEMENTS: Systems thinking · Systems knowledge · Systems governance · Systems doing · Systems investment · Systems learning

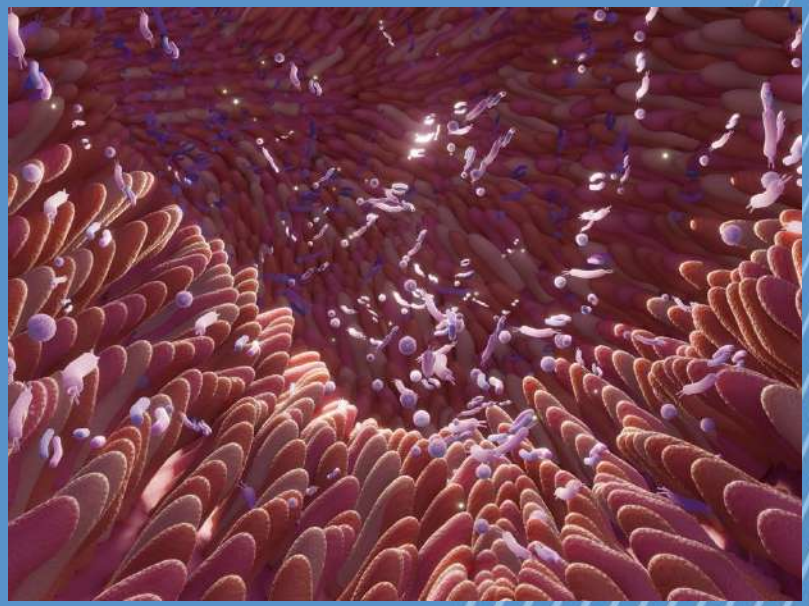

RAP
RNE
RLC
REU
RAF
Tools and approaches
WAAW
FAO AMR Website
InFARM
FAO-ATLASS
RENOFARM
FAO-PMP-AMR
Legal Methodology
Reference Centre
FAO Action Plan on AMR
Pilar 1: Awareness & engagement
Pilar 2: Surveillance & research
Pilar 3: Good practices
Pilar 4: Responsible use
Pilar 5: Governance & resources
Monthly meeting
Weekly AMR WG meeting
AMR WG coordination group
MEALR
NSA-director/ Chief Veterinarian
AMR coordinator
OH TWG
SMG & MPTF SC
QPT overall focal point
Global and regional projects are available on the FAO AMR website
Contact with external partners can be sent to FAO-AMR@fao.org or NSA-Director@fao.org
Quadripartite Collaboration
Multi-Partners Trust Fund
AMR Multi-Stakeholder Partnership Platform
Quadripartite M&E
Quadripartite integrated surveillance
Environment
AMR research agenda
Economic case
Legislation & regulation
Animal production
Animal health
Legislation
Land & water
IPPC
Aquaculture
Plant health
Codex
Food safety
CJN

Tratar um rio, como uma pessoa.



Food and Agriculture Organization
of the United Nations

AMR in the gut microbiome



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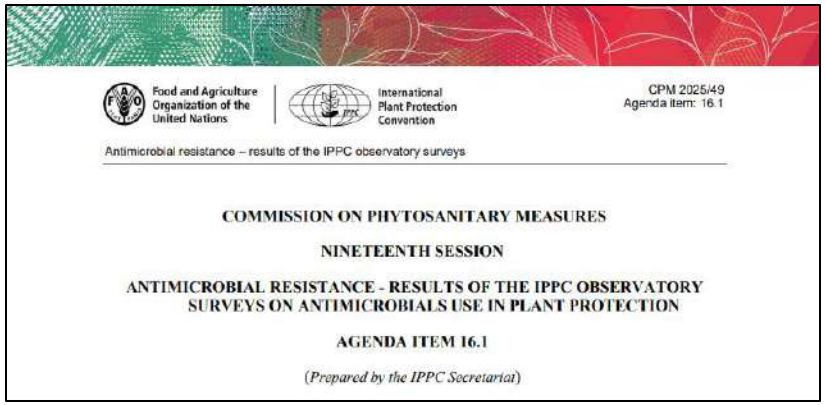
Antibiotic and fungicide use in the plant health sector



Food and Agriculture Organization of the United Nations | International Plant Protection Convention

CPM 2025/49
Agenda item: 16.1

Antimicrobial resistance – results of the IPPC observatory surveys

COMMISSION ON PHYTOSANITARY MEASURES

NINETEENTH SESSION

ANTIMICROBIAL RESISTANCE - RESULTS OF THE IPPC OBSERVATORY SURVEYS ON ANTIMICROBIALS USE IN PLANT PROTECTION

AGENDA ITEM 16.1

(*Prepared by the IPPC Secretariat*)

- *Among the **85 respondents, 29 (34%) confirmed the use of antibiotics in plant production**.*
- *Most frequently cited: **Kasugamycin** (72%; 21/29) and **Streptomycin** (79%; 23/29)*
- *Mainly used on tomato, potato and rice.*
- *Estimated quantities: vary from **324.7 kg to 2700 tonnes per year***

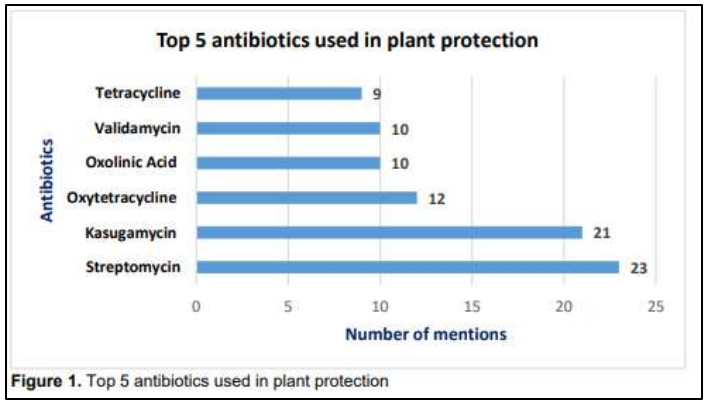


Figure 1. Top 5 antibiotics used in plant protection

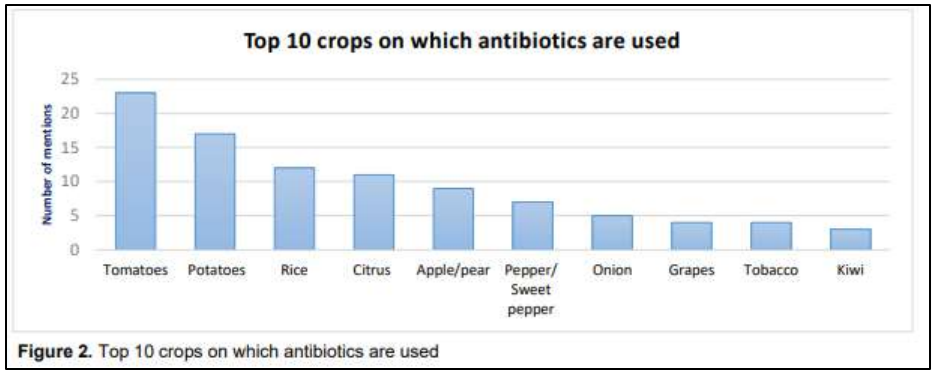
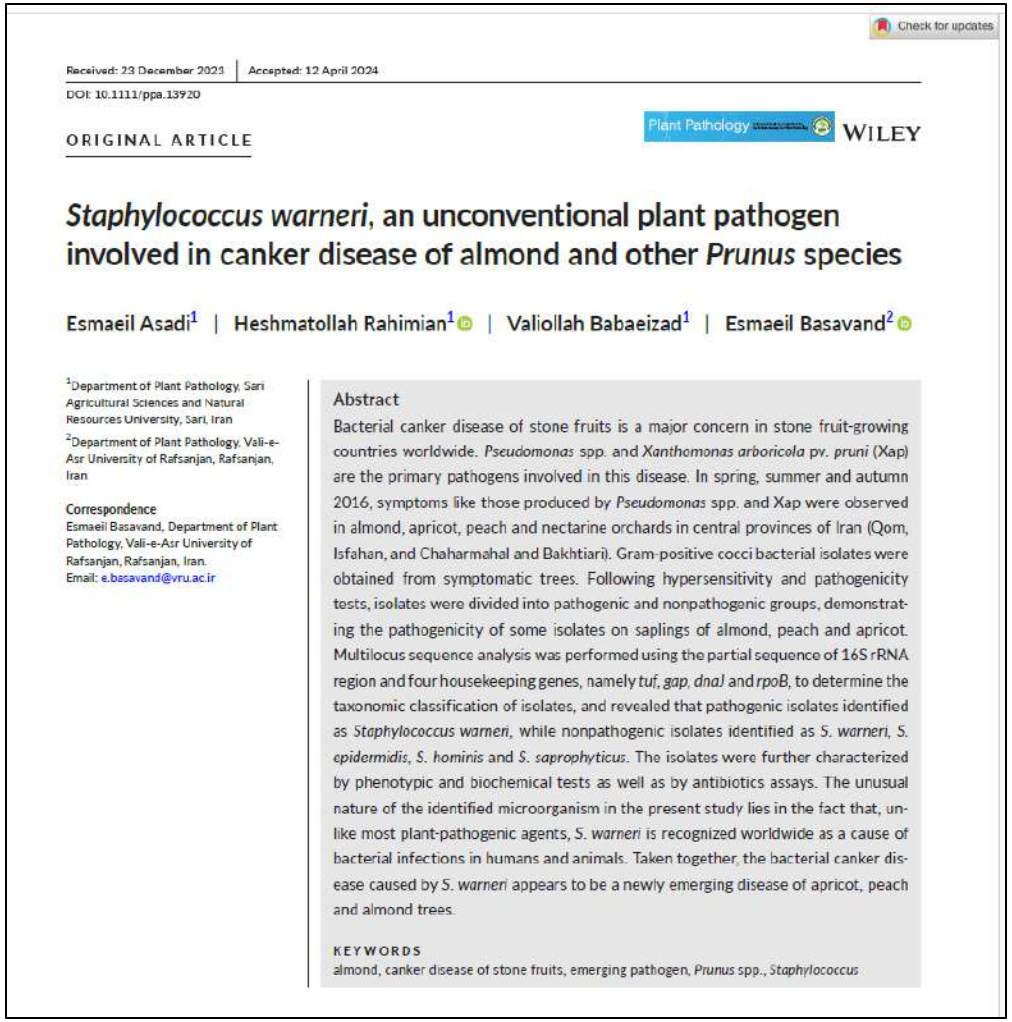


Figure 2. Top 10 crops on which antibiotics are used

Plant Health is crucial in the One Health concept and we need integrated surveillance.



Check for updates

Received: 23 December 2023 | Accepted: 12 April 2024

DOI: 10.1111/ppa.13920

ORIGINAL ARTICLE

Plant Pathology WILEY

Staphylococcus warneri, an unconventional plant pathogen involved in canker disease of almond and other *Prunus* species

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[2]Department of Plant Pathology, Vali-e-Asr University of Rafsanjan, Rafsanjan, Iran

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Esmaeil Basavand, Department of Plant Pathology, Vali-e-Asr University of Rafsanjan, Rafsanjan, Iran.
Email: e.basavand@vru.ac.ir

Abstract

Bacterial canker disease of stone fruits is a major concern in stone fruit-growing countries worldwide. *Pseudomonas* spp. and *Xanthomonas arboricola* pv. *pruni* (Xap) are the primary pathogens involved in this disease. In spring, summer and autumn 2016, symptoms like those produced by *Pseudomonas* spp. and Xap were observed in almond, apricot, peach and nectarine orchards in central provinces of Iran (Qom, Isfahan, and Chaharmahal and Bakhtiari). Gram-positive cocci bacterial isolates were obtained from symptomatic trees. Following hypersensitivity and pathogenicity tests, isolates were divided into pathogenic and nonpathogenic groups, demonstrating the pathogenicity of some isolates on saplings of almond, peach and apricot. Multilocus sequence analysis was performed using the partial sequence of 16S rRNA region and four housekeeping genes, namely *tuf*, *gap*, *dnaJ* and *rpoB*, to determine the taxonomic classification of isolates, and revealed that pathogenic isolates identified as *Staphylococcus warneri*, while nonpathogenic isolates identified as *S. warneri*, *S. epidermidis*, *S. hominis* and *S. saprophyticus*. The isolates were further characterized by phenotypic and biochemical tests as well as by antibiotics assays. The unusual nature of the identified microorganism in the present study lies in the fact that, unlike most plant-pathogenic agents, *S. warneri* is recognized worldwide as a cause of bacterial infections in humans and animals. Taken together, the bacterial canker disease caused by *S. warneri* appears to be a newly emerging disease of apricot, peach and almond trees.

KEYWORDS
almond, canker disease of stone fruits, emerging pathogen, *Prunus* spp., *Staphylococcus*

Approved: 26 January 2024
DOI: 10.2903/j.efsa.2024.8589

SCIENTIFIC REPORT

Antimicrobial consumption and resistance in bacteria from humans and food-producing animals

Fourth joint inter-agency report on integrated analysis of antimicrobial agent consumption and occurrence of antimicrobial resistance in bacteria from humans and food-producing animals in the EU/EEA

JIACRA IV – 2019–2021

European Centre for Disease Prevention and Control (ECDC) | European Food Safety Authority (EFSA) | European Medicines Agency (EMA)

- *In 2021, the total AMC in 29 EU/EEA countries was assessed at **125.0 mg/ per kg of biomass** (28 countries, range 44.3-160.1) **for humans** and **92.6 mg/ per kg of biomass for food-producing animals** (29 countries, range 2.5-296.5)*

- *Between 2014 and 2021, **the mean total AMC in mg/ per kg food-producing animals was decreased by 44%, while in humans, it remained relatively stable***

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

Control of AMR *development* vs Control of AMR *transmission*

A layered strategy for tackling antimicrobial resistance: the Swiss cheese model for policy, prevention, and engagement

Lancet Microbe 2025
Published Online
https://doi.org/10.1016/j.lanmic.2025.101035

Murphy's Law, 'anything that can go wrong will go wrong',[1] finds no more fitting application in public health than in the case of antimicrobial resistance (AMR). AMR will emerge whenever conditions permit. Despite robust evidence on the health and economic burdens of AMR, policy makers, governments, and international organisations face persistent challenges in implementing and financing comprehensive strategies.[2] Low political will, competing health priorities, weak health systems, and economic constraints hinder meaningful action.[3] Although few countries have made progress, such as the stringent antimicrobial stewardship programmes in Sweden[4] or the robust approaches of the Netherlands to reduce, monitor, and benchmark antimicrobial use in livestock,[5] the meagre number of effective policies only highlights the broader global inertia. Without sustained investment, strategic communication, and coordinated action, AMR will continue to threaten public health, undermine modern medicine, and impose substantial economic costs.[6]

Given these challenges, improved communication strategies are needed to raise awareness and policy change. The Swiss cheese model of system error, widely used to analyse adverse events in complex systems, provides a compelling framework for this purpose.[7] By illustrating how successive imperfect layers of defence can prevent harm when aligned effectively, the model communicates the importance of coordinated multilevel responses. Originally developed in the aviation sector[8] and subsequently adopted in health care,[9] the model gained prominence during the COVID-19 pandemic, when it helped communicate how layered interventions such as masking, distancing, and vaccination work synergistically to reduce transmission risk.[10]

Applying the Swiss cheese model to AMR highlights the necessity of multisectoral collaboration, coordination, communication, and capacity building (figure). We propose 15 codependent layers of contexts, strategies, and policies necessary to build a robust multitiered risk-reducing defence against AMR. These layers are grouped together within three categories, including One Health contexts, targeted interventions, and resource allocation.[11] The holes in the figure represent system failures that the resistant pathogens use to penetrate the various layers. When holes align, multiple system failures occur at once, with successful mitigation preventing complete system failure.

One Health contexts describe situations in which AMR emerges and disseminates across human, animal and plant, and environmental health. Within human health contexts, the behaviours of both the public and healthcare providers influence the spread and emergence of AMR, including inappropriate use and prescription of antimicrobials[12] and poor applications of infection prevention and control (IPC) measures such as hand hygiene, driving transmission of resistant pathogens in communities, hospitals, and long-term care facilities.[13] Self-medication and misconceptions about the effectiveness of antimicrobials against viral infections promote misuse across many regions.[14] In animal and plant health, the indiscriminate use of medically important antimicrobials for prophylaxis and metaphylaxis as growth promoters in food-producing animals and spraying antimicrobials on fruit or rice as a prophylactic measure, for example, exacerbates AMR in the agri-food sector.[15] In environmental health contexts, pharmaceutical waste, agricultural runoff, and untreated wastewater contribute to environmental reservoirs of resistance in water systems, the atmosphere, manure-treated soils, and aquatic environments.[16] Resistant bacteria within these environmental reservoirs share resistance genes with other bacteria through horizontal gene transfer.

Target interventions describe nine strategies applicable across One Health contexts that need to be operating effectively to reinforce AMR containment. Sanitation refers to strengthened access to clean water, sanitation, and hygiene (WASH) in environments where humans and animals coexist. WASH reduces transmission of infections among potential hosts, reducing the need for antimicrobials and the subsequent selection pressure for the development or escalation of AMR.[17] Widespread vaccination in humans and animals reduces transmission of infection, thus lowering the demand for antimicrobials and, therefore, the selection pressure on pathogens.[18] Promoting IPC requires strengthening hospital waste management, disinfection and sterilisation, routine

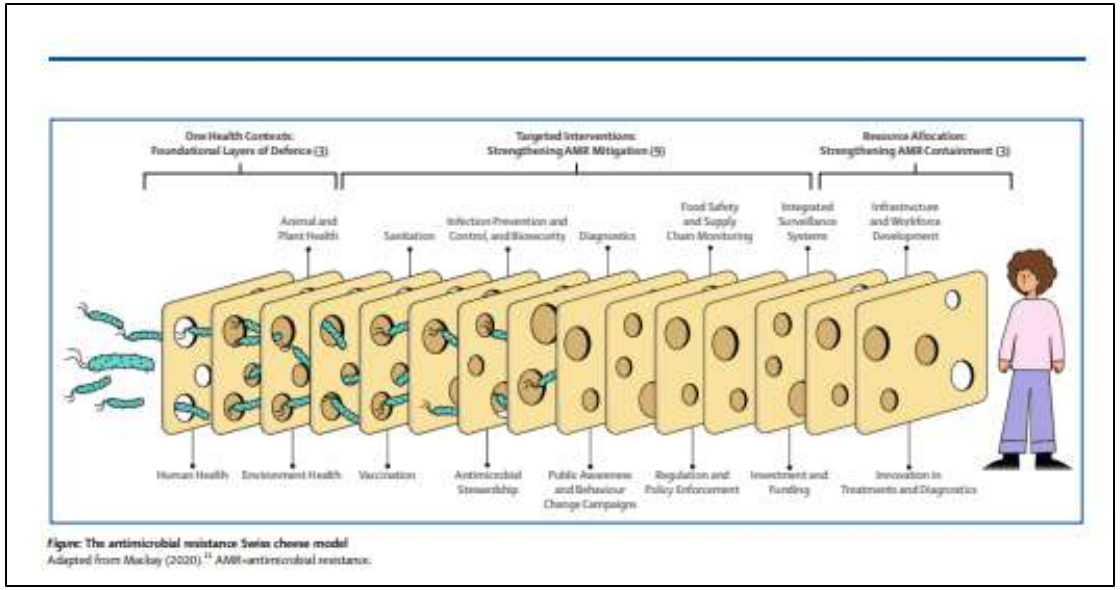


Figure: The antimicrobial resistance Swiss cheese model
Adapted from Mackay (2020).[11] AMR=antimicrobial resistance.

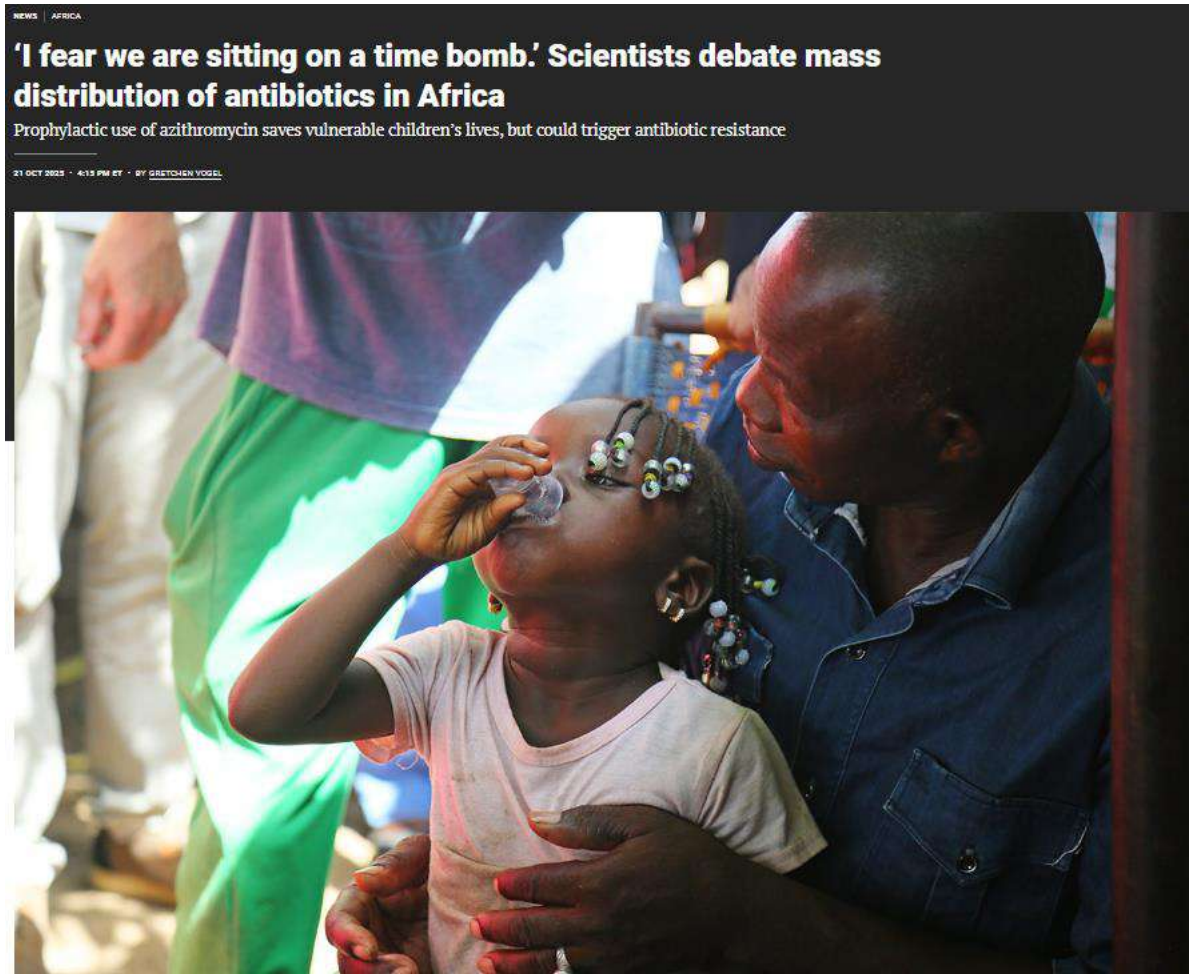
Randomized Controlled Trial > PLoS Med. 2024 May 6;21(5):e1004386.
doi: 10.1371/journal.pmed.1004386. eCollection 2024 May.

Prolonged mass azithromycin distributions and macrolide resistance determinants among preschool children in Niger: A sub-study of a cluster-randomized trial (MORDOR)

Ahmed M Arzika [1], Amza Abdou [1], Ramatou Maliki [1], Nassirou Beido [1], Boubacar Kadri [1], Abdoul N Harouna [1], Abdoul N Galo [1], Mankara K Alio [1], Elodie Lebas [2], Catherine E Oldenburg [2 3 4], Kieran S O'Brien [2 3 4], Cindi Chen [2], Lina Zhong [2], Zhaoxia Zhou [2], Daisy Yan [2], Armin Hinterwirth [2], Jeremy D Keenan [2 3], Travis C Porco [2 3 4], Thomas M Lietman [2 3 4], Thuy Doan [2 3]; MORDOR Study Group

Affiliations + expand

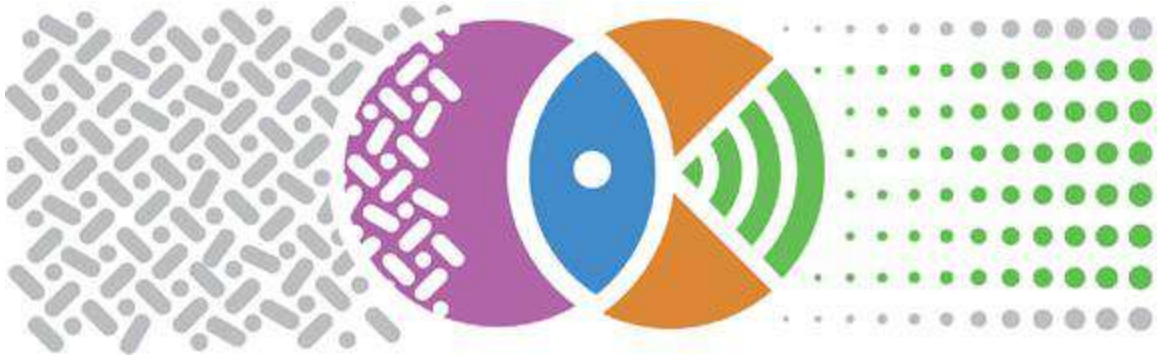
PMID: 38709718 PMCID: PMC11073710 DOI: 10.1371/journal.pmed.1004386



www.science.org – 21/10/2025

The InFARM Objectives

The International FAO Antimicrobial Resistance Monitoring (InFARM) data platform



- To support countries in collecting, analyzing and using their AMR data from animals and food
- To support countries willing to publicly share AMR data from food and agriculture sectors for global surveillance, as a public good for international advocacy and action against AMR

Reduce the Need for Antimicrobials on Farms For Sustainable Agrifood Systems Transformation (RENOFARM) (2023-2033)

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

ACT project in a nutshell: implementation of Codex standards (integrated surveillance and CoP)

Countries:

Asia (Cambodia, Mongolia, Pakistan, Nepal)
South America (Bolivia and Colombia)

Duration:

Five years (2021-2026)

Budget:

US$ 10 million

Donor:

Republic of Korea (ROK)

Use of Antimicrobials as Growth Promoters among Poultry Farmers in Nepal: Associated Behaviors and Economic Considerations

in collaboration with

Action to support the implementation of Codex AMR Texts (ACT) Project, FAO Nepal

Dr. Megha Raj Banjara

Principal Investigator

Central Department of Microbiology

Tribhuvan University

Key conclusion and recommendation

- Farmers with more knowledge of or more cautious attitudes toward AMR are not more likely to engage in better practices than those without knowledge or cautious attitudes.

- **Behaviour change interventions should be implemented. Shift from knowledge-based to behaviour-based IEC (Information, Education, Communication) strategies. IEC material could focus on practices that help to reduce the need for antimicrobials, such as biosecurity and vaccines.**

Is it all about the money?

Stewardship concerns a moral responsibility that extends from the present to the future (temporal responsibility) and from the individual to broader populations (collective responsibility) *(Hibbard et al., 2024)*

It is OUR challenge…so what do WE need to focus on?

- (Agrifoood) Systems thinking (wealth)
- *Ego* vs *Eco* centric
- Behaviour change: they are ours

Muito obrigado.

Jorge.pintoferreira@fao.org